



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,732	07/31/2003	Todd Yeh	03178-URS	3884

7590 08/17/2004
Supreme Patent Services
Post Office Box 2339
Saratoga, CA 95070-0339

EXAMINER

HAMILTON, CYNTHIA

ART UNIT	PAPER NUMBER
----------	--------------

1752

DATE MAILED: 08/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/632,732	Applicant(s) YEH, TODD	
	Examiner Cynthia Hamilton	Art Unit 1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☒ Claim(s) 19, 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 July 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "10" has been used to designate both a substrate in FIG 1- 4 and PCB in Fig 5(A) to 5(C). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

1. Claim Interpretation

Claim 1 is which is the only independent claim present is as follows:

1. A solventless thermosetting photosensitive via-filling material, which comprises:
one or more liquid epoxy resins;
one or more monomers;
one or more photo-initiators; and
one or more epoxy resin curing agents.

a. "solventless" – formulations which are effectively free of unreactive liquid diluents or solvents; "100% solids" compositions. Definition is found in Watt (3,721,616) at col. 2, starting at line 25 as follows:

25 However, epoxide and related compositions contain-
ing photosensitive catalyst precursors have a tendency
to gel upon standing, even in the absence of light or
ultra-violet radiation. This tendency to undergo prema-
ture reaction is particularly troublesome in the case of
30 formulations of the solventless type which are effec-
tively free of unreactive liquid diluents or solvents.
Thus the problem of inconveniently short shelf on pot
life may limit rather drastically the utility of
polymerizable compositions essentially free of volatile
35 solvents, which for practical purposes may be defined
as compositions containing less than about 4 percent by
weight of solvents boiling below about 190°C. Such sol-
vents include toluene, chlorobenzene, chlorotoluene,
and acetonitrile. The polymerization reaction is ex-
40 othermal and, where large masses are involved, can
generate sufficient heat to cause combustion of the
epoxide resins.

and from col. 1 of Eckberg et al (4,279,717) as follows:

Thus, it has been noted that there is a need to provide
a solventless coating composition which will, however, 30
remain easy to apply to the substrate. Such solventless
coating compositions are sometimes referred to as
"100% solids" compositions. The absence of solvent in
such compositions lowers the amount of energy re-
quired to effect a cure and eliminates the need for ex- 35
pensive pollution abatement equipment. The present
invention provides a solventless pre-crosslinked epoxy
functional polydiorganosiloxane fluid which will cure
to a non-adherent surface when combined with an effec-
tive amount of a linear alkylate diaryl iodonium salt and 40
exposed to ultraviolet radiation.

b. "thermosetting" - Thermoset is used to reference epoxy resins by Muskopf in
Ullmann's Encyclopedia of Industrial Chemistry, "Epoxy Resins", "1. Introduction".
Thermosetting as described in Kaufman et al, Introduction to Polymer Science and
Technology: An SPE Textbook, is the nature of a composition to form an irreversible
hardened material by chemical reaction called cross-linking on page 9, and crosslinked

Art Unit: 1752

plastics are known as thermoset resins or network polymers on page 131. Thus, for examination purposed “thermosetting” is taken to limit the composition claimed to be one which can be formed into a crosslinked or network polymer as set forth in Kaufman et al.

c. “via-filling”- the examiner interprets this as intended use of the material claimed.

Thus its use in the preamble of claims 1-26 is not considered a limitation and is of no significance to claim construction. *Pitney Bowes, Inc., v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir. 2999). See also *Rowe V. Dror*, 112, F3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997).

d. “epoxy resin” – prepolymers that contain, on the average, two or more epoxide groups per molecule as defined by Muskopf in Ullmann’s Encyclopedia of Industrial Chemistry, “Epoxy Resins”, “1.Indroduction”. Penn et al on page 48, teach “epoxy resin” to be used confusingly in the art and notes “In practice, other types of molecules are added to the epoxide to formulate a thermosetting system, i.e. one that will undergo a curing reaction to harden into a rigid form. The confusing practice has been followed of referring to both the epoxide alone and the formulated system as ‘epoxy resin’. One must determine which is truly intended by the context in which it is used.” The examiner noting [0022] of the instant application has considered applicants to mean the epoxide alone when referencing “epoxy resin” and not the formulated system as described in Penn et al.

e. “monomer” – “a substance composed of molecules which can polymerize with like or unlike molecules” as defined on page 377 of Grant & Hackh’s Chemical Dictionary, Fifth Edition.

Art Unit: 1752

- f. “epoxy resin curing agents” – any agent that cures epoxy resins.

Claim 26 does not require the presence of any organic adjuvant wherein the amount is zero.

Claim 19 does not require the presence of any inorganic filler wherein the amount is zero.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 3 is as follows:

3. The solventless thermosetting photosensitive via-filling material according to claim 1, wherein said monomers comprise at least one of the compounds selected from a group consisting of mono-functional monomer, difunctional monomer, trifunctional monomer and tetra & penta-functional monomer.

The use of “functional” in “mono-functional monomer”, “difunctional monomer”, “trifunctional monomer” and “tetra & penta-functional monomer” is not clearly defined as to what function is being enumerated. Is this any group that can polymerize? Is glycidyl methacrylate a mono functional monomer or a difunctional monomer? Does function refer to any reactive group on a “monomer”? Without definition of “function” in claims 3-7 a worker of ordinary skill in the art would be unsure what the limits of the claimed invention are; thus, claims 3-7 are indefinite.

The examiner notes that applicant’s claim 4 cites allyl methacrylate as a “mono functional

Art Unit: 1752

monomer when it clearly has two polymerizable groups in allyl and methacrylate. Thus, do applicants mean by “functional” only acrylate or methacrylate groups? The examiner has used the broadest reasonable definition of “functional” with respect to examination.

5. Claims 13 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the last two lines of claim 13 is found. This appears to be a trademark or trade name. Claims 13 and 15 contain the trademark/trade names “Adeka EH-4337S” and “Adeka EH-4070S and “Air Products Ancamine-2014DG”. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade names are used to identify/describe a choice of epoxy resin thermal curing agent and, accordingly, the identification/description is indefinite.

6. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. What is meant by EPU in “flexible EPU modified epoxy resins” is unclear. The examiner found no definition for EPU previous to the filing date of this application but found many trade name materials such as

Art Unit: 1752

urethane modified epoxy resin EPU-X-4-2 (trade name of Asahi Denka Co. Ltd.) (US 3,869,366)

Urethanized Epoxy Resin (EPU-10 68 having an epoxy equivalent of 320 to 360 and a viscosity (at 40.degree. C.) of 150 to 300 poises, a product of Asahi Denka) (US 4,205,018)

"EPU 73" (manufactured by ASAHI DENKA KOGYO K.K.), an urethane-modified epoxy resin having an epoxy equivalent of 220 to 250 (US 4,999,135)

EPU-385 (trade name of Asahi Denka Kogyo Kabushiki Kaisha in Japan; urethane-modified epoxy resin having a solid content of 70% by weight and an epoxy equivalent of 900) (US 5,164,430)

Thus, it is unclear what is encompassed by "flexible EPU modified epoxy resins" in claim 2. In claim 2 is also found "dimmer-modified epoxy resins". A search of US patents by this phrase yielded no hits in the PTO database. A search for "dimer-modified epoxy resins" did yield two hits. US 6,045,873 was published prior to the instant filing date. US 4,073,762 gives examples of epoxy resins of dimer acids. Thus, the examiner believes applicants may mean dimer instead of dimmer. The examiner is unsure however as to what "modified" means with respect to this phrase.

7. Claims 17-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 17 requires that the material of claim 1 further comprise an inorganic filler, but claim 19 appears to make such an addition optional by adding the inorganic filler in a range inclusive of zero amount. Thus, what is meant by "comprising" in claim 17 is confusing. Is claim 19 outside the scope of claim 17 or do applicants mean the wording of claim 17 to include no filler being present? The following objection to claim 19 is made in view of this confusion.

8. Claim 19 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 17 requires that the material of claim 1 further comprise an

Art Unit: 1752

inorganic filler, but claim 19 appears to make such an addition optional by adding the inorganic filler in a range inclusive of zero amount. Thus, claim 19 is broader in scope than claim 17 if claim 17 requires the presence of the inorganic filler.

9. Claims 20-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 20 limits the material of claim 1 to "further comprising one or more organic adjuvants", but claim 26 appears to claim a broader range of material in that the organic adjuvant is added to an amount of 0-50 parts by weight, based on 100 parts by weight of the epoxy resin of claim 1. Thus, a zero amount of the organic adjuvant in claim 26 appears to make "further comprising one or more organic adjuvants" to mean not comprising an organic adjuvant. Thus, what is meant by "comprising" in claim 20 is confusing. Is claim 26 outside the scope of claim 20 or do applicants mean the wording of claim 20 to include no filler being present? The following objection to claim 26 is made in view of this confusion.

10. Claim 26 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 26 is broader in scope than claim 19 if claim 19 requires the presence of the organic adjuvant if zero is chosen as the range to be used in claim 26.

11. Claims 1-11, 16, 20 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by De Voe et al (5,863,847) as evidenced by Chang (4,915,990). With respect to instant claims 1-9, 11 and 20, the Example A in col. 24 of De Voe et al is a species that anticipates the instant material. The composition in De Voe et al is as follows:

Example A

15 Coated abrasive articles A1–A6 each used a backing that
was a 115 g/m² paper backing commercially available from
Kammerer, Germany. A make coat precursor for each of
examples A1 to A6 was prepared from DS1227 (20.7 parts),
EP1 (30.5 parts), EP2 (33.7 parts), CHDM (2.9 parts), Abitol
20 E(7.0 parts), COM (0.6 part), “KB1” (1.0 part) and AMOX
(0.6 parts). The batch was prepared by melting DS1227 and
EP-2 together at 140° C., mixing, then adding EP-1, CHDM,
and Abitol E and mixing at 100° C. Then, TMPTA, in the
amounts indicated in Table 1, was added with mixing at 100°
25 C. To this sample was added COM, AMOX, and KB 1
followed by mixing at 100° C. The make coat precursor was
applied at 125° C. by means of a knife coater to the paper
backing at a weight of about 100 g/m².

30 It was observed that that the formulations containing 5%
and 10% TMPTA, i.e., examples A2, A3, A5 and A6, were
lower in viscosity at the coating temperature than the
unmodified formulations in A1 and A4, and, as a result, were
somewhat easier to coat onto the backing.

with definitions found in

col. 23 as follows:

Art Unit: 1752

23		5,863,
DS1227	a high molecular weight polyester under the trade designation "DYNAPOL S1227" commercially available from Huls America, Piscataway, NJ.	
DS1402	a high molecular weight polyester with low crystallinity under the trade designation "DYNAPOL S1402" commercially available from Huls America, Piscataway, NJ.	5
EP1	a bisphenol A epoxy resin under the trade designation "EPON 828" (epoxy equivalent wt. of 185-192 g/eq) commercially available from Shell Chemical, Houston, TX.	10
EP2	a bisphenol A epoxy resin under the trade designation "EPON 1001F" (epoxy equivalent wt. of 525-550 g/eq) commercially available from Shell Chemical, Houston, TX.	
CHDM	cyclohexanedimethanol	
HS	backing of made according to U.S. Pat. No. 5,505,747 with hooking stem as shown in FIG. 2 herein and similar to hooking stem illustrated in FIG.'s 2c and 2d of U.S. Pat. No. 5,505,747.	15
TMPTA	trimethylol propane triacrylate commercially available from Sartomer Co., Exton, PA under the trade designation "SR351".	
Et-TMPTA	ethoxylated trimethylol propane triacrylate commercially available from Sartomer Co., Exton, PA under the trade designation "SR454".	20
PETA	pentaerythritol tetraacrylate commercially available from Sartomer Co., Exton, PA under the trade designation "SR295".	
NPGDA	neopentylglycol diacrylate commercially available from Sartomer Co., Exton, PA under the trade designation "SR247".	25
Abitol E	tackifier commercially available from Hercules Inc., Wilmington, DE.	
"KB1"	2,2-dimethoxy-1,2-diphenyl-1-ethanone commercially available from Ciba-Geigy under the trade designation "IRGACURE 651" or commercially available from Sartomer Co., Exton, PA under the trade designation "KB1" per se.	30
COM	eta ⁶ -[xylenes (mixed isomers)]eta ⁵ -cyclopentadienyl-iron(1+) hexafluoroantimonate (1-) (acts as a catalyst).	
AMOX	di-t-amylloxalate (acts as an accelerator).	
FLDSP	feldspar	35
CRY	cryolite	
BAO	brown fused aluminum oxide	
HTAO	heat treated fused aluminum oxide	

Chang evidences Epon 828 in col. 3, lines 61-68, as a liquid epoxy resin. KB1 is a photosensitive free radical initiator and COM is curing agent for the epoxy resin. DS 1227 is the organic adjuvant. TMPTA is the trifunctional acrylate compound found in instant claim 6.

Art Unit: 1752

There is no monofunctional monomer, difunctional monomer or tetra & pentafunctional monomer, therefore the composition of De Voe et al reads on the instant claim 4-5 and 7 wherein no component is present to choose. The choice of the component is not the requirement that it be present in the instant claim language. Claim 3 only requires that one of the group be selected.

With respect to instant claims 1-11, 16, 20, and 26, Example 11 of De Voe et al anticipates the instant material wherein PETA is a tetrafunctional acrylate compound as set forth in instant claim 7. Example 11 is in De Voe et al described as follows:

EXAMPLES 9-14

Additional coated abrasives were prepared according to the same procedure described for Example A except with the formulations changed to those indicated in Table 4. The six formulations for Examples 9-14 cover a variety of hot melt systems varying the polyfunctional acrylate, the type of polyester, and the presence of a tackifier. The effective concentration range of the polyfunctional acrylate is proportional to the equivalent weight of the polyfunctional acrylate and inversely proportional to the functionality of the polyfunctional acrylate.

TABLE 4

Components Parts by Wt.	EX. 9	EX. 10	EX. 11	EX. 12	EX. 13	EX. 14
DS-1227	20.7	20.1	20.8	19.9		
DS-1402					37.5	54.3
EP-1	30.5	29.6	30.6	29.4	28.2	20.1
EP-2	33.7	32.8	33.9	32.5	25.3	18.1
CHDM	2.9	2.8	2.9	2.8	2.3	2.3
TMPTA	3.0				4.5	3.0
Et-TMPTA		5.8				
PETA			2.7			
NPGDA				6.4		
COM	0.6	0.6	0.6	0.6	0.6	0.6
KB1	1.0	1.0	1.0	1.0	1.0	1.0
t-AMYL OX.	0.6	0.6	0.6	0.6	0.6	0.6
Abitol E	7.0	6.8	7.0	6.7		
Total parts	100.0	100.0	100.0	100.0	100.0	100.0

The coated abrasive articles prepared from each of Examples 9-14 were then evaluated for mineral pickup and cut according to TEST #1 (after 500 cycles). The results are reported in Table 5.

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless —

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Art Unit: 1752

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1-3, 7-9 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Tokita et al (5,445,855) as evidenced by Hino et al (5,302,666), Toagsei, or RN 16969-10-1, Okita et al (4,664,965) or Kushi et al (4,970,135). The composition of Example 1 of Tokita et al anticipates the instant composition. EPOMIK R-140 is the thermosetting bisphenol A epoxy resin that is liquid as evidenced by Hino et al in the paragraph bridging col. 2 and 3, ending with

Art Unit: 1752

line 16 on page 3 listing EPOMIK R140 as an example of a bisphenol A type epoxy compound being liquid at room temperature. The instant one or more monomers is anticipated by the acrylates monomer Aronix M-5700 and three acrylate oligomers of Aronix M-6100, M-6300, and M-8030. Aronix M-5700 is 2-hydroxy-3-phenoxy-propyl acrylate as evidenced by Toagsei listing from their Business web cite and RN 16969-10-1 from Registry file from ACS on STN. Aronix M-6100 is a polyester diacrylate as evidenced by Okita et al in the following paragraph of EXAMPLE 1 of Okita et al in col.5:

A polyester diacrylate having a molecular weight of 60 (trade name "Aronix M 6100", acrylated polycondensates of dihydric alcohol and dibasic acid manufactured by Toa Gosei Chemical Industry Co., Ltd., viscosity 200-500 (at 25° C.) was coated on polyethylene terephthalate film having a thickness of 14.5 μ m, and was 65 exposed to electron beams at an absorption amount of 2 Mrad, an acceleration voltage of kV and a beam electric current of 5 mA to yield an intermediate layer.

Thus, Aronix M-6100 is an instant "difunctional monomer" if function refers to polymerizing function. In reference to Aronix M-6100, M-6300, and M-8030 is also found in Kushi et al, in the paragraph bridging col. 6-7. The passage of importance is as follows:

Art Unit: 1752

65 ble bond=170], and various oligoester (meth)acrylates manufactured by Toagosei Chemical Industry Co., Ltd., such as Aronix M-6100 [average molecular weight=450; molecular weight per polymerizable dou-

7

ble bond=225), Aronix M-6250 [average molecular weight=450; molecular weight per polymerizable double bond=225], Aronix M-6500 [average molecular weight=446; molecular weight per polymerizable double bond=223], Aronix M-7100 [average molecular weight=565; molecular weight per polymerizable double bond=188], Aronix M-8030 average molecular weight=393, molecular weight per polymerizable double bond=119], Aronix M-8060 average molecular weight=489; molecular weight per polymerizable double bond=136], Aronix M-8100 average molecular weight=618; molecular weight per polymerizable double bond=155] and Aronix M-6300 average molecular weight=478; molecular weight per polymerizable double bond=239].

15

Aronix M-6100 is by this difunctional, Aronix 6300 is by this is difunctional, and Aronix 8030 is trifunctional with respect to the polymerizable double bonds being the function desired. Since these Aronix compounds do not meet the requirements of instant claims 4-6, Tokita et al do not meet the claimed invention of instant claims 4-6. However, instant claim 7 only requires that if a tetra & penta=functional monomer is selected that it be from the group set forth. There is no requirement by claim 7 that said tetra & penta=functional monomer be present at all. Thus, the composition of Tokita et al having no tetra & penta=functional monomer anticipates the composition of instant claim 7. Cyclopentadienyl isopropylphenyl iron (II) salt in Example 1 of Tokita et al is the instant epoxy curing agent and cumene hydroperoxide is the free radical photo-initiator. "A generic claim cannot be allowed to an applicant if the prior art discloses a species falling within the claimed genus." The species in that case will anticipate the genus. *In re Slayter*, 276 F.2d 408, 411, 125 USPQ 345, 347 (CCPA 1960); *In re Gosteli*, 872 F.2d 1008, 10 USPQ2d 1614 (Fed. Cir. 1989). Thus, the species set forth by Takita et al anticipates the instant

Art Unit: 1752

composition. This Example is the “solventless” version of the Takita et al composition addressed in lines 61-66 in col. 6 of Takita et al. Applicants clearly do not intend to limit “epoxy resin curing agents” in claim 1 only to “epoxy resin thermal curing agent” because they add such a limit in dependent claim 12. Thus, paragraph [0027] of applicant’s disclosure is not clearly setting forth a definition for “Epoxy resin curing agents”. The passage in question is:

“Epoxy resin curing agents as used herein comprise epoxy resin thermal curing agents.”

The examiner does not take this passage as an example of applicants clearly setting forth a definition of the term that is different from its ordinary and customary meaning (s) due to the presence of claim 12 and because the wording is not explicitly setting forth a definition. See *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994) and MPEP 2111.02, III. 8th ed, May 2004 revision. Applicants do not define “thermosetting” thus giving it the broadest reasonable definition; the examiner has applied the term to the epoxy resin chosen. Thus the material of Tokita et al is thermosetting because the epoxy resin used is a thermosetting epoxy resin. The passage of Tokita et al disclosing the Example 1 is as follows:

EXAMPLE 1

Preparation of an adhesive

An epoxy resin of the bisphenol A type (EPOMIK R-140 produced by Mitsui Petrochemical Industries, Ltd.) was mixed with an acrylate monomer (Aronix M-5700, produced by Toa Synthetic Chemical Industry, Co., Ltd.) and three acrylate oligomers (Aronix M-6100, M-6300 and M-8030, produced by Toa Synthetic Chemical Industry, Co., Ltd.) in an epoxy resin/M-5700/M-6100/M-6300/M-8030 weight ratio of 80/7/5/3/5. One hundred parts of the resulting mixture was mixed with 2 parts by weight of cyclopentadienyl isopropylphenyl iron (II) salt (a product of Ciba-Geigy Co., Ltd.), 0.25 part by weight of anthracene (Wako Pure Chemicals Co., Ltd.) and 3.1 parts by weight of cumene hydroperoxide (70% grade produced by Kayaku Noury Corporation) to obtain a composition (adhesive) in accordance with the invention.

Art Unit: 1752

15. Claims 1-3, 7-9, 11, 20, 22, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokita et al (5,445,855) as evidenced by Hino et al (5,302,666), Toagsei, or RN 16969-10-1, Okita et al (4,664,965) or Kushi et al (4,970,135). The composition of Example 1 of Tokita et al anticipates the instant composition of claims 1-3, 7-9, 11, 20, 22, 24 and 26 as described below. EPOMIK R-140 is the thermosetting bisphenol A epoxy resin that is liquid as evidenced by Hino et al in the paragraph bridging col. 2 and 3, ending with line 16 on page 3 listing EPOMIK R140 as an example of a bisphenol A type epoxy compound being liquid at room temperature. The instant one or more monomers is anticipated by the acrylates monomer Aronix M-5700 and three acrylate oligomers of Aronix M-6100, M-6300, and M-8030. Aronix M-5700 is 2-hydroxy-3-phenoxy-propyl acrylate as evidenced by Toagsei listing from their Business web cite and RN 16969-10-1 from Registry file from ACS on STN. Aronix M-6100 is a polyester diacrylate as evidenced by Okita et al in the following paragraph of EXAMPLE 1 of Okita et al in col.5:

A polyester diacrylate having a molecular weight of 60 (trade name "Aronix M 6100", acrylated polycondensates of dihydric alcohol and dibasic acid manufactured by Toa Gosei Chemical Industry Co., Ltd., viscosity 200-500 (at 25° C.) was coated on polyethylene terephthalate film having a thickness of 14.5 μ m, and was 65 exposed to electron beams at an absorption amount of 2 Mrad, an acceleration voltage of kV and a beam electric current of 5 mA to yield an intermediate layer.

Thus, Aronix M-6100 is an instant "difunctional monomer" if function refers to polymerizing function. In reference to Aronix M-6100, M-6300, and M-8030 is also found in Kushi et al, in the paragraph bridging col. 6-7. The passage of importance is as follows:

Art Unit: 1752

65 ble bond=170], and various oligoester (meth)acrylates manufactured by Toagosei Chemical Industry Co., Ltd., such as Aronix M-6100 [average molecular weight=450; molecular weight per polymerizable dou-

7
ble bond=225), Aronix M-6250 [average molecular weight=450; molecular weight per polymerizable double bond=225], Aronix M-6500 [average molecular weight=446; molecular weight per polymerizable double bond=223], Aronix M-7100 [average molecular weight=565; molecular weight per polymerizable double bond=188], Aronix M-8030 average molecular weight=393; molecular weight per polymerizable double bond=119], Aronix M-8060 average molecular weight=489; molecular weight per polymerizable double bond=136], Aronix M-8100 average molecular weight=618; molecular weight per polymerizable double bond=155] and Aronix M-6300 average molecular weight=478; molecular weight per polymerizable double bond=239].

Aronix M-6100 is by this difunctional, Aronix 6300 is by this is difunctional, and Aronix 8030 is trifunctional with respect to the polymerizable double bonds being the function desired. Since these Aronix compounds do not meet the requirements of instant claims 4-6, Tokita et al do not meet the claimed invention of instant claims 4-6. However, instant claim 7 only requires that if a tetra & penta=functional monomer is selected that it be from the group set forth. There is no requirement by claim 7 that said tetra & penta=functional monomer be present at all. Thus, the composition of Tokita et al having no tetra & penta=functional monomer anticipates the composition of instant claim 7. Cyclopentadienyl isopropylphenyl iron (II) salt in Example 1 of Tokita et al is the instant epoxy curing agent and cumene hydroperoxide is the free radical photoinitiator. "A generic claim cannot be allowed to an applicant if the prior art discloses a species falling within the claimed genus." The species in that case will anticipate the genus. *In re Slayter*, 276 F.2d 408, 411, 125 USPQ 345, 347 (CCPA 1960); *In re Gosteli*, 872 F.2d 1008, 10 USPQ2d 1614 (Fed. Cir. 1989). Thus, the species set forth by Takita et al anticipates the instant

Art Unit: 1752

composition. This Example is the “solventless” version of the Takita et al composition addressed in lines 61-66 in col. 6 of Takita et al. Applicants clearly do not intend to limit “epoxy resin curing agents” in claim 1 only to “epoxy resin thermal curing agent” because they add such a limit in dependent claim 12. Thus, paragraph [0027] of applicant’s disclosure is not clearly setting forth a definition for “Epoxy resin curing agents”. The passage in question is: “Epoxy resin curing agents as used herein comprise epoxy resin thermal curing agents.”

The examiner does not take this passage as an example of applicants clearly setting forth a definition of the term that is different from its ordinary and customary meaning (s) due to the presence of claim 12 and because the wording is not explicitly setting forth a definition. See *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994) and MPEP 2111.02, III. 8th ed, May 2004 revision. Applicants do not define “thermosetting” thus giving it the broadest reasonable definition; the examiner has applied the term to the epoxy resin chosen. Thus the material of Tokita et al is thermosetting because the epoxy resin used is a thermosetting epoxy resin. The passage of Tokita et al disclosing the Example 1 is as follows:

EXAMPLE 1**Preparation of an adhesive**

An epoxy resin of the bisphenol A type (EPOMIK R-140 produced by Mitsui Petrochemical Industries, Ltd.) was mixed with an acrylate monomer (Aronix M-5700, produced by Toa Synthetic Chemical Industry, Co., Ltd.) and three acrylate oligomers (Aronix M-6100, M-6300 and M-8030, produced by Toa Synthetic Chemical Industry, Co., Ltd.) in an epoxy resin/M-5700/M-6100/M-6300/M-8030 weight ratio of 80/7/5/3/5. One hundred parts of the resulting mixture was mixed with 2 parts by weight of cyclopentadienyl isopropylphenyl iron (II) salt (a product of Ciba-Geigy Co., Ltd.), 0.25 part by weight of anthracene (Wako Pure Chemicals Co., Ltd.) and 3.1 parts by weight of cumene hydroperoxide (70% grade produced by Kayaku Noury Corporation) to obtain a composition (adhesive) in accordance with the invention.

Art Unit: 1752

With respect to making the invention of claims 1-3, 7-9, and 11 *prima facie* obvious over Tokita et al, the use of a liquid epoxy resin to form the solventless composition makes obvious the use of all liquid epoxy resins listed to do so even if not identified as liquid because such was used in an example of a solventless composition. Tokita et al clearly identifies the want to form a “solventless” adhesive composition. With respect to instant claims 20, 22, 24 and 26, the addition of a 50 parts by weight per 100 parts of the four components already listed here by With respect to instant claims 20, 22, 24 and 26, Tokita et al as an additive to increase adhesion and impart flexibility in a “solventless” composition makes the addition of such to the compositions of Example 1 of Tokita *prima facie* obvious as is the addition of reactive diluents, sensitizers, thickening agents, i.e. thixotropic agents and rheological adjuvant, antisagging agents, storage stabilizers and plasticizers which are all listed by Tokita et al as optional at the bottom of col. 6 and top of col. 7. In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. *In re Werthheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 UAPQ2d 1934 (Fed. Cir. 1990). See particularly MPEP 2144.05.

16. Claims 1-7, 9, 12-14, 16 and 20 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Hosomi et al (5,756,190). With respect to instant claims 1-3, 9, 12-13, 16 and 20 and 26 (zero amount), Example 1 of Hosomi et al discloses a composition in col. 8 as follows

Separately, 100 parts of a brominated cresol novolak epoxy resin (bromination degree: 35%, epoxy equivalent: 280, weight average molecular weight: 1,400), 100 parts of a bisphenol A type epoxy resin (epoxy equivalent: 950, weight average molecular weight: 1,600) and 40 parts of a bisphenol F type epoxy resin (epoxy equivalent: 175, molecular weight: 380) were dissolved in 50 parts of glycidyl methacrylate and 70 parts of hydroxyethyl methacrylate, and to the solution were added 4 parts of 2-phenyl-4-methylimidazole and 8 parts of 1-cyanoethyl-2-ethyl-4-methylimidazole as curing agents and 10 parts of a photopolymerization initiator (Irgacure 651, a trade name of Ciba Geigy for 2,2-dimethoxy-2-phenylacetophenone), and they were mixed thoroughly in a homomixer to prepare an undercoating agent.

which is a species that anticipates the instant composition wherein bisphenol F type epoxy resin is the instant liquid epoxy resin, glycidyl methacrylate is a "difunctional monomer", hydroxyethyl methacrylate is a "difunctional monomer", the curing agents are 2-phenyl-4-methylimidazole and 1-cyanyethyl-2-ethyl-4-methylimidazole, the instant photo-initiator is 2,2-dimethoxy-2-phenylacetophenone. Hosomi et al generically define this composition in col. 3 as follows:

more preferably, an undercoating agent for a multilayer printed circuit board wherein the normally solid epoxy resin having a softening point of 45° to 120° C. (a) is a mixture 5 of:

(A) a brominated novolak type epoxy resin having a bromination degree of not less than 20% and a molecular weight of 500 to 4,000,

(B) a bisphenol type epoxy resin having a molecular 10 weight of 500 to 2,000, and

(C) a bisphenol type liquid epoxy resin having a molecular weight of not more than 500;

the epoxy resin curing agent (b) is a mixture of: 15

(D) a high temperature-curable imidazole compound having a melting point of not less than 130° C. and

(E) a low temperature-curable imidazole compound; and the diluent (c) in which the epoxy resin is dissolved and which consists of a photopolymerizable monomer is a 20 mixture of:

(F) glycidyl acrylate or glycidyl methacrylate and

(G) hydroxyethyl acrylate, hydroxyethyl methacrylate or triethylene glycol dimethacrylate. 25

Claims 4 and 6-7 are rejected because Hosomi et al does not make use of a monofunctional monomer or trifunctional monomer or tetra & penta functional monomer therefore the choice of such is not made. The compositions of instant claims 4 and 6-7 do not exclude such compositions but instead limit those compositions wherein monofunctional monomer or trifunctional monomer or tetra & penta functional monomer are present to specific members being present. "A generic claim cannot be allowed to an applicant if the prior art discloses a species falling within the claimed genus." The species in that case will anticipate the genus. *In re Slayter*, 276 F.2d 408, 411, 125 USPQ 345, 347 (CCPA 1960); *In re Gosteli*, 872 F.2d 1008, 10 USPQ2d 1614 (Fed. Cir. 1989). With respect to instant claims 1, 3-7, 9, 12-14, 20, the claimed undercoating agent of claims 7-13 of Hosomi et al anticipate the instant composition wherein (C) is instant liquid epoxy resin, (F), (D) especially triethylene glycol dimethacrylate

Art Unit: 1752

are the instant monomers, (d) is the instant photo-initiator, and (E) especially as set forth in claim 12 as 2-metholyimidazole is the instant epoxy resin curing agent.

17. Claims 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosomi et al as applied to claim 1 above. As described above the composition of Hosomi et al anticipates the instant composition of instant claim 1. That the Hosomi et al compositions are intended to be solventless is taught by Hosomi et al in col. 6 as follows:

**The light and heat-curable undercoating agent for a multilayer printed circuit board of this invention is a substantially solventless system but can fill the concaves between
55 circuits in an internal layer circuit board to smoothen the internal layer circuit surface. Moreover, the undercoating agent is easily solidified upon irradiation with a light to be made tack-free.**

That other additives than those found in the Examples and the claims of Hosomi et al are taught optional is found in their disclosure in col. 6 as follows:

In addition, the undercoating agent for a multilayer printed circuit board of this invention may, if necessary for storage stability, have added thereto an ultraviolet inhibitor, a heat-polymerization inhibitor, a plasticizer or the like. Also, for adjusting the viscosity, there can be added an acrylate monomer, a methacrylate monomer, a vinyl monomer or the like. Moreover, there can be incorporated an inorganic filler such as molten silica, crystalline silica, calcium carbonate, aluminum hydroxide, alumina, barium sulfate, mica, talc, clay, white carbon, E glass powder or the like, and there can be added an epoxysilane coupling agent for improving the adhesiveness to the copper foil and internal layer circuit board and the moisture resistance, a defoaming agent for preventing voids or a liquid or powdery flame retardant, or the like.

Thus, with respect to the addition of an inorganic filler, heat-polymerization inhibitor, plasticizer, viscosity-adjusting agent, i.e. leveling agent or rheological adjuvant or organic adjuvant, or defoaming agent would

have been prima facie obvious because such was taught by Hosomi et al as optional additions to their undercoating agent.

18. Claims 1-3, 6-7 and 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Goto et al (5,151,454) as evidenced by Akiyama et al (4, 987,186) and RN 7473-98-5. With respect to instant claims 1-3, 6-7 and 9-13, the composition set forth in Example 3 of Goto et al in col. 19, lines 26-50, as follows:

EXAMPLE 3

An amount of 60 parts of Epoxy Ester 3002A (Kyoei-sha Yushi Kogyo K.K., Japan), i.e., an epoxy diacrylate 30 having a vinyl equivalent of 300 and a viscosity of 50000 cps at 25° C., 15 parts of n-butyl acrylate, 15 parts of 2-ethylhexyl acrylate, 10 parts of glycidyl methacrylate and 3 parts of 2-hydroxy-2-methylpropiophenone were admixed with an amount of 100 parts of an epoxy resin 35 (Epotohto YD-128 by Tohto Kasei K.K., Japan) having an epoxy equivalent of 189 and a viscosity of 13000 cps at 25° C., to provide a base resin 3.

An amount of 572 parts of a dimer acid (Versadyme 288 having an acid number of 196 by Nippon Henkel 40 K.K., Japan) were reacted with 295 parts of triethylene-tetramine to provide a polyamide amine. To 100 parts of the polyamide amine were mixed 5 parts of 2,4,6-tris(dimethylaminomethyl)phenol to provide a curing agent 3 as a solution having a viscosity of 1300 cps at 25° C. 45

Then, 100 parts of the base resin 3 and 43 parts of the curing agent 3 were mixed together, to provide an adhesive composition. The composition was coated in a thickness of 100 μ m on an iron plate which had been polished with a #240 sand paper, and was irradiated for 50

anticipates the instant

composition wherein Akiyama et al identify Epotohto YD-128 in col. 6, lines 43-47, as an epoxy resin of bisphenol A epichlorohydrin type. 2-hydroxy-2-methylpropiophenone is the same compound as instant 2-hydroxy-2-methylphenylpropanone in instant claim 10 as evidenced by RN 7473-98-5. The compositions of instant claims 6-7 do not exclude such compositions but

Art Unit: 1752

instead limit those compositions wherein trifunctional monomer or tetra & penta functional monomer are present to specific members being present.

19. Claims 1-4, 6-12, 16-20, 26 rejected under 35 U.S.C. 102(b) as being anticipated by Diamant et al (5,514,729). With respect to instant claims 1-4, 6-12, 16-20, 26, the compositions of Examples 9-11 of Diamant et al anticipate the instant material. "A generic claim cannot be allowed to an applicant if the prior art discloses a species falling within the claimed genus." The species in that case will anticipate the genus. *In re Slayter*, 276 F.2d 408, 411, 125 USPQ 345, 347 (CCPA 1960); *In re Gosteli*, 872 F.2d 1008, 10 USPQ2d 1614 (Fed. Cir. 1989). The passage of Diamant et al of importance is found in col 9 and is as follows:

9

EXAMPLE 8

The resin formulation comprising 50% by weight of 3,4-epoxy cyclohexyl methyl-3,4-epoxy cyclohexyl carboxylate, 13% caprolactone triol, 1% 1,4-cyclohexane dimethanol divinyl ether, 23% 1,6-hexanediol diacrylate, 10% mixed salts of triarylsulfonium hexafluoroantimonate, 3% 2-hydroxy-2-methyl-1-phenyl-propan-1-one, 0.01% hydroquinone, and 0.1% dicumyl peroxide. The mixing procedures are as described above.

EXAMPLE 9

The resin formulation of example 8, in which the % weights of 3,4-epoxy cyclohexyl methyl-3,4-epoxy cyclohexyl carboxylate, 1,6-hexanediol diacrylate, and caprolactone triol are 55%, 15% and 16%, respectively. The mixing procedures are as described above.

EXAMPLE 10

A resin formulation comprising 33% 3,4-epoxy cyclohexyl methyl-3,4-epoxy cyclohexyl carboxylate, 7% glycerol-propyleneoxide polyether triol, 6% polyether triol, 1% triethylene glycol diol, 6% 1,4-cyclohexane dimethanol divinyl ether, 10% partially acrylated bisphenol A epoxy, 23% 1,6-hexanediol diacrylate, 10% mixed salts of triarylsulfonium hexafluoroantimonate, 4% 2-hydroxy-2-methyl-1-phenyl-propan-1-one, 0.01% hydroquinone, and 0.5% dicumyl peroxide. The mixing procedures are as described above.

EXAMPLE 11

The resin formulation of example 10 in which the dicumyl peroxide is eliminated and 1% hydrophobic fumed silica is added. The mixing procedures are as described above.

Examples 12 and 13 are epoxy formulations based on bisphenol F epoxy, and glycidyl ether of para amino phenol which harden only slowly under exposure to UV radiation. As discussed above, these formulations may be combined with any of the formulations of examples 1-11 to form a composite UV hardenable, solventless polymeric composition having improved adhesion properties.

with the Abstract showing

the compositions of Examples 9-11 are to be mixed with silver filler. The Abstract is below:

[57]

ABSTRACT

A dimensionally stable, UV hardenable polymeric composition is provided in which a conductive filler material is combined with a solventless resin formulation comprising a low viscosity epoxide compound, a photo initiator, and a thermal cure initiator. The properties of the polymeric composition may be adjusted through the addition of reactive diluents, poly alcohol flexibilizers, and acrylate based polymers, photo initiators, and thermal cure initiators. Conductive traces produced by extruding the polymeric composition through a syringe are subjected to a preliminary UV hardening step followed by deposition of an insulator layer and additional conductive traces, until all layers of conductive traces have been deposited. The structure is then subjected to heat until the conductive traces are fully cured. The formulation and the process described produce traces with bulk conductivity at least two times higher than any comparable conductive polymer, without using solvents. This process is purely additive, non-polluting and does not produce waste.

The hydrophilic silica is silicon dioxide and added as a viscosity increasing agent as set forth in col. 6, lines 48-56. Thermal catalysts are inclusive of dicumyl peroxide as set forth in col. 5, as follows:

One difficulty in developing UV hardenable epoxies for use in conductive polymeric materials is that silver does not transmit UV radiation. As a result, the core regions of conductive polymer traces are shielded from UV radiation. 25 In the compositions of the present invention which are up to 90% silver by weight, shielding of the core polymer material is very efficient, and these interior regions may not be adequately or completely cured by UV radiation. However, for purposes of depositing overlapping circuit traces without 30 creating electrical shorts, only the outer surface of the conductive polymeric materials needs to be hardened in the UV radiation step. Typically, UV curing affects only the part of the polymeric composition which is concentrated at the surface of the conductive trace for the reason described 35 above. The remainder of the resin formulation is cured thermally, once all the circuit traces have been completely deposited on the circuit board. For this purpose, the resin formulation includes thermal cure catalysts.

Typical of the thermal cure catalysts employed in the 40 present invention are the amine complexes of boron trifluoride. For example, a boron trifluoride amine complex which is activated at 302° F. has a shelf life of 6 months in the epoxy formulation if stored at or below 77° F. Another boron trifluoride amine complex which is activated at 260° F. has 45 a shelf life in the epoxy formulation of 6 to 10 weeks if stored below 77° . Where the resin formulation includes acrylates or vinyls, a dicumyl peroxide [bis(1 -methyl- 1 -phenylethyl) peroxide] thermal cure catalyst may be added.

The compositions of instant claims 4 and 6-7 do not exclude such compositions but instead limit those compositions wherein monofunctional monomer or trifunctional monomer or tetra & penta functional monomer are present to specific members being present. The monomers present in the Examples of Diamant et al are 1,4-cyclohexane dimethanol divinyl ether and 1,5-hexanediol diacrylate. Hydroquinone is an organic adjuvant, i.e. a thermal polymerization inhibitor,

20. Claims 1-3, 9, 11-12, 16-20, 23 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Eramo, Jr et al (5,364,736) as evidenced by Nakata et al (4, 069,174). With respect to instant claims 1-3, 9, 11-12, 16-20, 23 and 26, the composition of Example 2 of

Art Unit: 1752

Eramo, Jr. et al anticipates the instant material wherein liquid cycloaliphatic diepoxy is the instant epoxy resin. Example 1 is as follows:

EXAMPLE 2	
Components	% Wt.
Acrylic resin with minimum acid number of two hundred	37.3
Hydroxyethyl acrylate	26.8
Hexamethylmelamine	10.9
Benzophenone	1.9
Liquid cycloaliphatic diepoxy	22.6
1,8 diaza-bicyclo-(5,4,0) undecene 7	0.5
	<hr/> 100.0
plus	
Leveling agent	1.2
Pigment (phthalocyanine green CI#74260)	1.2
<u>Fillers</u>	
polyvinylidene fluoride	9.3
micro talc	22.3

Benzophenone is the photosensitive free radical initiator, hydroxyethyl acrylate is the either mono functional or difunctional monomer. Micro talc is the talcum powder filler. 1,8 diaza-bicyclo-(5,4,0) undecene 7 combined with the aid in the acrylic resin is the curing agent as evidenced by Nakata et al in paragraph bridging col. 1 and 2 teaching acids and said undecene ad curing agents for epoxy resin.

21. Claims 1-3, 9, 11-13, 16, 19 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Green (4,092,443). With respect to instant claims 1-3, 9, 11-13, 16, 19 and 26, many of the Examples of Green anticipate the instant material. Taking Example 3 as one that does, the examiner notes that the epoxides used are small and inherently liquid. In Green, see particularly the Abstract, col. 3 and col. 15-16.

Art Unit: 1752

22. Claims 1-3, 5, 9, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Willett et al (5,252,694) as evidenced by Muskopf (Epoxy Resins), Penn et al and Chang (4,915,990). With respect to instant claims 1-3, 5, 9, and 20, the compositions set forth by Willett et al in their claim 12 anticipates the instant composition wherein a diglycidyl ether of bisphenol A(epoxy eq wt of 185-192 g/eq) is known in the epoxy art to be liquid as evidenced by Muskopf in Table 1 and Penn et al at page 51, table 3.1, and by the use of EPON 828 by Willett et al in their Examples. Chang evidences Epon 828 in col. 3, lines 61-68, as a liquid epoxy resin.

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Omoya et al (6,139,777) teaches forming via filling compositions with epoxy resins. Yeh (2003/0035903 A1) teach via-filling inks based on epoxy materials. Chen et al (2003/0203994) appears to teach the instant invention but does not because there is reaction of the epoxy resin with acrylic acid then anhydride to form the binder. Thus, there is no clear addition of liquid epoxy resin to the whole combination. It is instead an intermediate reactant.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Hamilton whose telephone number is 571-272-1331.

The examiner can normally be reached on Monday through Friday 9:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H Kelly can be reached on (571) 272-0729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1752

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Cynthia Hamilton
Primary Examiner
Art Unit 1752

August 15, 2004

**CYNTHIA HAMILTON
PRIMARY EXAMINER**